

DECEMBER 3.

The President, Dr. JOSEPH LEIDY, in the chair.

Forty-five persons present.

A paper entitled "On the Modification of the Apex in *Murex*," by Frank C. Baker was presented for publication.

*Notes on the drift on Block Island.*—Mr. Theo. D. Rand remarked that this island, lying in the Atlantic Ocean off the extreme easterly point of Long Island, shows the drift formation as he had seen it nowhere else. The shores in many parts rise from the ocean as precipitous bluffs to a height from one hundred to two hundred feet. The outer surface is constantly eroded while the summits are preserved by a growth of grass generally too high above the water for drifting sands to cover. Thus excellent sections are exposed.

The island is pear-shaped, about seven miles from north to south and between three and four from east to west at its widest point which is probably a mile and a half from its southern edge.

There is not a creek or running water of any kind on the island except a few springs bordering the ocean, neither is there a valley strictly so called. The whole island is made up of rounded hills and bowl-like depressions, the bottom of the latter usually occupied by a fresh-water pond, in many of which flourish water lilies of remarkable size and beauty. Most of it is covered with a soil of sand, clay and gravel which seems to be quite fertile.

Here and there are boulders ranging down from two thousand cubic feet (visible above ground), but the stone fences, which everywhere divide the farms often into quite small fields, testify that man's industry has removed many thousands from the surface.

The island has been described as pear-shaped, but a little north of the middle of the pear is a brackish pond of more than a thousand acres in extent, with but a narrow isthmus of sand separating it from the ocean on the east and on the west. On the west this isthmus has been dredged through and the tide now flows in and out. On the east the isthmus is not over one hundred yards wide and not over, probably, five or ten feet above high tide. North of this isthmus the ground gradually rises to high bluffs. South and southwest of it almost all the land is elevated, the extreme height being some three hundred feet at Beacon Hill.

On examining the bluffs it would appear at first sight that erosion is progressing with great rapidity, as along most of the bluffs large boulders line the shore and extend a considerable distance seaward forming a breakwater. The cause of this was not at first apparent. With few exceptions the bluffs were clothed with grass to their extreme edges. The descent from the edge was generally precipitous

with perhaps one-tenth of the contour indented to a slope of thirty degrees or more.

In the precipitous portions the sections were very perfectly shown. There is some clay but the larger portion of material is gravel intermixed with pebbles and boulders of various sizes, the boulders some times rounded and often not. The variety of rock was great. The material evidently came chiefly from the Laurentian. Granite and syenite are probably in the largest quantity and greatest variety. White quartz is abundant; several varieties of porphyry, porphyritic gneiss, garnetiferous gneiss, mica schist and epidote occur more rarely.

Careful examination shows that considerable drainage from the island takes place through these bluffs. This was plainly visible in July when the ponds evidently were not at their highest, and he was inclined to attribute much of the erosion to this trivial but constantly acting cause. During times of frost its influence must be considerable.

In these sections, as a rule, the material is heterogeneous, clay, sand, gravel and boulders being commingled in seeming confusion, but at times there is evidence of a sorting. Thus at Clay Head near the north part of the island, there is a great preponderance of clay, but in the sections may be seen what were evidently the beds of ponds, in which muddy water had, for a time, deposited its clay free from stones, this being afterwards buried in the coarser detritus. He saw nothing whatever organic in any of the exposures.

These alternations of clay and gravel account for the existence of the numerous ponds which appear to be simply collections of rain water in clayey bottoms, the water rising until a porous stratum is reached through which the water percolates to the ocean. At one place a higher pond had an outlet to a lower and here erosion by running water was apparent, but it was trivial and almost the only one seen, except what might be attributed to excessive rainfall, such as may be seen along our roadsides after a heavy rain. Some of the grass-covered slopes are very steep and this absence of recent erosion shows the extreme porosity of the general surface.

What most impressed Mr. Rand was the probable very slight change of surface since the glacial epoch. Contrasting this with the erosion in south-eastern Pennsylvania of rocks so very much harder than the loose sand gravel and clays of Block Island the time within which the erosion of the former must have been progressing would seem almost infinite.

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DECEMBER 10.

The President, Dr. JOSEPH LEIDY, in the chair.

Thirty-three persons present.